A COMPARATIVE STUDY BETWEEN ULTRASOUND WITH FOAM ROLLER VERSUS ULTRA SOUND WITH ADDUCTOR STRENGTHENING IN ILIOTIBIAL BAND FRICTION SYNDROME IN CYCLISTS.

Dissertation

Submitted To

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In partial fulfillment for the degree of

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(SPORTS PHYSIOTHERAPY)

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CHERRAAN'S COLLEGE OF PHYSIOTHERAPY

Cherraan's Institute of Health Science

(Affiliated to the Tamilnadu Dr. MGR Medical University)

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May 2018

CERTIFICATE

The work embodied in the thesis entitled '**A COMPARATIVE STUDY BETWEEN ULTRASOUND WITH FOAM ROLLER VERSUS ULTRA SOUND WITH ADDUCTOR STRENGTHENING IN ILIOTIBIAL BAND FRICTION SYNDROME IN CYCLISTS'** submitted to the **Tamilnadu Dr. MGR Medical University, Chennai** in the partial fulfillment for the degree of **Master of Physiotherapy (sports physiotherapy)**was carried out by candidate bearing register no 271650125 at cherraan's college of physiotherapy Coimbatore under my supervision. This is an original work done by him and has not been submitted in part or full for any other degree/diploma at this or any other university/ institution. The thesis is fit to be considered for evaluation for award of the degree of master of physiotherapy.

…… **……..……**

Signature of Supervisor **Signature of Principal**

Mr. A. CHINNACHAMY MPT (sports) **Mrs.E.SELVARANI, MPT (neuro)**

Date:…… **Date: ……**

…… **……**

Internal Examiner **External Examiner**

Project work evaluated on ……..

DECLARATION

I hereby declare and present my project work entitled '**A COMPARATIVE STUDY BETWEEN ULTRASOUND WITH FOAM ROLLER VERSUS ULTRA SOUND WITH ADDUCTOR STRENGTHENING IN ILIOTIBIAL BAND FRICTION SYNDROME IN CYCLISTS',** the outcome of original research work undertaken and carried out by me, under the guidance of Professor **Chinnachamy MPT,(Sports),** Cherraan's College of Physiotherapy, Coimbatore. I also declare that the material of this project work has not formed in any way the basis for the award of any other degree previously from The Tamil Nadu Dr. M.G.R. Medical University, Chennai-32.

…….. ……

Signature of Supervisor **Signature of Student**

Mr. A.Chinnachamy MPT (sports) **O. Okendro Singh**

Date:

Place:

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CONTENT

INTRODUCTION

The iliotibial band (ITB) or tract is a lateral thickening of the fascia lata in the thigh. Proximally it splits into superficial and deep layers, enclosing tensor fasciae latae and anchoring this muscle to the iliac crest Standring, 2004. It also receives most of the tendon of gluteus maximus. The ITB is generally viewed as a band of dense fibrous connective tissue that passes over the lateral femoral epicondyle and attaches to Gerdy's tubercle on the anterolateral aspect of the tibia

Iliotibial band friction syndrome (ITBFS) is an inflammatory, repetitive strain injury to the knee that is particularly common in long cyclists and distance runners. ITBFS may be caused by a multitude of factors including training errors, and/or lower leg misalignments. The main symptom of ITBFS is a sharp pain on the outer aspect of the knee that can radiate into the outer thigh or calf. Patients typically present with tenderness over the lateral femoral epicondyle and report a sharp, burning pain when the practitioner presses on the lateral epicondyle during knee flexion and extension Ekman et al. 1994. The pain is particularly acute when the knee is at 30° of flexion (Orchard et al. 1996; Fredericson & Wolf, 2005. Traditionally, this condition has been described in the literature to occur with repeated flexion of the knee, with the most irritation occurring at about the 30 degrees of flexion mark. The mechanism is described as a friction that takes place between the IT band and the lateral femoral condyle.

The cause(s) may be anything from a change in training load, bike fit changes, shoe or cleat change, or a bio-mechanical issue with strength or flexibility that has become prominent due to increase in riding volume.

Common causes are:

- Incorrect saddle height
- Saddle change
- Cleat adjustments or cleat change fitted poorly
- Leg length discrepancies
- Foot bio-mechanics
- Poor flexibility around hip and pelvis
- Poor glutes strength
- Riding a different bike to normal

Treatment options described in the research literature are all fairly standard. An article in the Clinical Journal of Sports Medicine published in 2006 describes common practical management of IT band syndrome. During the acute phase it is recommended that treatment focus on modification of activity, ice, anti-inflammatory medication or injections for severe swelling or pain. The subacute phase should focus on stretching and soft tissue therapy to release any myofascial restrictions. Recovery focuses on exercises to rehabilitate the hip abductors and the integration of hip movement patterns.

A study published in the journal Sports Medicine in 2005 also suggests activity modification during the acute phase of injury, eliminating myofascial restrictions during the subacute phase and then proceeding with a rehabilitation program focused on strength and muscular re-education of the hip abductors and the surrounding muscles. This author

states that the exercises should emphasize eccentric contractions of the muscles and incorporate triplanar motions and integrated movement patterns.

Self-myofascial release has become a progressively common form of treating soft tissue injuries with a foam roller. Unfortunately, there is insufficient clinical data proving the efficacy on treatment of diagnosed injuries that foam rollers are claimed to treat (Healey, 2011). New research suggests that pain thresholds are altered immediately through use of a foam roller on the iliotibial band (Vaughan & McLaughlin, 2014)

The purpose of this study is to determine the effectiveness of ultrasound with foam roller versus ultrasound with adductor strengthening in regards to reduce the pain and improves the functional activity in IT band friction syndrome.

NEED OF THE STUDY

ITBFS is a common non-traumatic overuse injury that is particularly common in cyclists. Management of ITB has been a tough program due to the mechanism involved in the lower limb. Muscle imbalance plays a major role in the occurrence and re-occurrence .planning and execution of specific exercise for the hip muscle on a whole.

Initial goals of therapy for ITFS is to reduce pain, swelling and inflammation. Pain-free modified training can then be implemented to improve strength and flexibility of the hip, thigh, and calf musculature, as well as cardiovascular fitness. The end goal is to return the athlete to a pain-free cycling routine. ITBFS can usually be treated successfully with a conservative rehabilitation program that includes a flexibility and strength home exercise program. Grading the injury helps to determine the plan of treatment.

AIM AND OBJECTIVES

AIM OF THE STUDY

To compare the effectiveness of ultrasound with foam roller versus ultrasound with adductor strengthening program to reduced pain and improve functional activities in patients with IT band friction syndrome in cyclists.

OBJECTIVES OF THE STUDY

- To determine the effectiveness of ultrasound with foam roller technique to reduce the pain and improve the functional activities in the patients with IT friction syndrome.
- To determine the effectiveness of ultrasound with adductor strengthening to reduce the pain and improve the functional activities in the patients with IT friction syndrome.
- To determine the effectiveness of ultrasound with foam roller Vs ultrasound with adductor strengthening to reduce the pain and improve the functional activities in the patients with IT friction syndrome.

HYPOTHESIS

- **NULL HYPOTHESIS**

The null hypothesis states that there was no significant difference between ultrasound with foam roller and ultrasound with adductor strengthening program to reduce pain and improve functional activities in patients with IT band friction syndrome.

- **ATERNATIVE HYPOTHESIS**

The alternative hypothesis states that there may be significant difference between ultrasound with foam roller and ultrasound with adductor strengthening program to reduce pain and improve functional activities in patients with IT band friction syndrome.

REVIEW OF LITERATURE

Kathleen M. Sullivan,[1] Dustin B.J. Silvey, (2013 Jun)

Foam and stick (roller massager) rolling are purported to act as self-myofascial release techniques. The pressure on the fascia from rolling may allow fascia to become soft and lengthen,

Behara B, Jacobson BH.(2017 Apr;31)

Hip flexibility was statistically significant when tested after both dynamic stretching and foam rolling ($p = 0.0001$). Although no changes in strength or power was evident, increased flexibility after DTR may be used interchangeably with traditional stretching exercises.

Heather M. McCormack ., et al ., (2008)

Visual Analogue Scales (VAS) provide a simple technique for measuring subjective experience. They have been established as valid and reliable. Decisions concerned with the choice of scoring interval, experimental design, and statistical analysis for VAS have in some instances been based on convention, assumption and convenience, highlighting theneed for more comprehensive assessment of individual scales if this versatile and sensitive measurement technique is to be used to full advantage.

George W. Torrance, PhD, et al., (2007)

Visual analog scales (VASs) have long been used as a method of measuring preferences for health outcomes. They are easy and inexpensive to implement, can be administered quickly, and lend themselves to self-completion.. This article reviews

briefly the history, theory, practice, problems, and advantages of VASs; presents some suggestions to improve the validity

Teresa S.M. Yeung, et al.,(2009)

The LEFS has acceptable validity on outpatients in assessing functional mobility, but it has not been tested for use on an inpatient orthopaedic ward. Inpatients in an orthopaedic ward (n = 142) completed the 20-item, self-report LEFS on admission, 7 to 10 days after admission, and on discharge. To test reliability, 24 patients had the LEFS repeated 1 day after the admission test, and the intraclass correlation (ICC) and the standard error of measurement (SEM) were calculated. Change scores of the LEFS were evaluated against patients' and therapists' rating of improvement, and change scores of comparison measures that included pain, functional performance, and the composite index created from scores of these comparison measures. The SRM of the LEFS from admission to discharge was 1.76 on patients rated as improved. The LEFS is reliable and valid to assess group and individual change, and has large responsiveness. The LEFS and the comparison measures likely assess different constructs.

Razib Khaund , M.D., et al., (2005)

Treatment requires active patient participation and compliance with activity modification. Most patients respond to conservative treatment involving stretching of the iliotibial band, strengthening of the gluteus medius, adductors and altering training regimens. Corticosteroid injections should be considered if visible swelling or pain with ambulation persists for more than three days after initiating treatment. A small percentage of patients are refractory to conservative treatment and may require surgical release of the iliotibial band.

Patrick Dale., (2011)

During adduction, the adductors stretch from the inside of the knee to the bottom of pelvis. Strong adductors are important in knee and hip stability, and if they become weakened, the knees are prone to dropping outward.

Wood RW, et al., (2001)

In view of the scientific rationales for the use of ultrasound in soft tissue lesions, it would be premature to abandon the use of ultrasound because of the current lack of clinical evidence for effect. Studies must include ultrasound units that are calibrated regularly and other variables, such as coupling media and transducer surface area, must be described clearly. Adequate randomized double□blind placebo□controlled clinical studies are required of the use of ultrasound therapy at specific doses in specific, closely defined soft tissue lesions.

Van Der Windt Da., et al.,(1999)

Ultrasound therapy is used frequently to reduce pain and related disability, mainly by physiotherapists. The objective of this review was to evaluate the effectiveness of ultrasound therapy in the treatment of musculoskeletal disorders. evaluating the effects of ultrasound therapy In 11 out of 13 placebo-controlled trials with validity scores of at least five out of ten points, no evidence of clinically important or statistically significant results was found. Statistical pooling was only feasible for placebo-controlled trials, and produced a pooled estimate for the difference in success rate of 15% (95% confidence interval -8%-38%). As yet, there seems to be little evidence to support the use of ultrasound therapy in the treatment of musculoskeletal disorders. The large majority of 13 randomized placebo-controlled trials with adequate methods did not support the existence

of clinically important or statistically significant differences in favour of ultrasound therapy.

VJ Robertson, PT, PhD, (2001)

Ten of the 35 RCTs were judged to have acceptable methods using criteria based on those developed by Sackett et al. Of these RCTs, the results of 2 trials suggest that therapeutic ultrasound is more effective in treating some clinical problems than placebo ultrasound, and the results of 8 trials suggest that it is not. There was little evidence that active therapeutic ultrasound is more effective than placebo ultrasound for treating people with pain or a range of musculoskeletal injuries or for promoting soft tissue healing.

Falvey Ec , Clark Ra , (2010)

ITB junction was measured on 20 subjects during isometric hip abduction. The ITB was uniformly a lateral thickening of the circumferential fascia lata, firmly attached along the linea aspera (femur) from greater trochanter up to and including the LFC. The microstrain values [median (IQR)] for the OBER [15.4(5.1-23.3)me], HIP [21.1(15.6-44.6)me] and SLR [9.4(5.1-10.7)me] showed marked disparity in the optimal inter-limb stretching protocol. HIP stretch invoked significantly (Z=2.10, P=0.036) greater strain than the SLR. TFL/ITB junction displacement was 2.0+/-1.6 mm and mean ITB lengthening was <0.5% (effect size=0.04). Our results challenge the reasoning behind a number of accepted means of treating ITBS. Future research must focus on stretching and lengthening the muscular component of the ITB/TFL complex.

Razib Khaund, M.D , (2005)

In some athletes, repetitive flexion and extension of the knee causes the distal iliotibial band to become irritated and inflamed resulting in diffuse lateral knee pain.

Iliotibial band syndrome can cause significant morbidity and lead to cessation of exercise. Although iliotibial band syndrome is easily diagnosed clinically, it can be extremely challenging to treat. Treatment requires active patient participation and compliance with activity modification. Most patients respond to conservative treatment involving stretching of the iliotibial band, strengthening of the gluteus medius, and altering training regimens. Corticosteroid injections should be considered if visible swelling or pain with ambulation persists for more than three days after initiating treatment. A small percentage of patients are refractory to conservative treatment and may require surgical release of the iliotibial band.

Skinner Ja Pringle J et., al (2003)

One of the greatest proposed benefits of ultrasound therapy is that it is thought to reduce the healing time of certain soft tissue injuries.

Ultrasound is thought to accelerate the normal resolution time of the inflammatory process by attracting more mast cells to the site of injury. This may cause an increase in blood flow which can be beneficial in the sub acute phase of the tissue injury. As blood flow may be increased it is not advised to use ultrasound immediately after injury

Ultrasound may also stimulate the production of more collagen the main protein component in soft tissue such as tendons and ligaments. Hence ultrasound may accelerate the proliferative phase of tissue healing.

Ultrasound is thought to improve the extensibility of mature collagen and so can have a positive effect to on fibrous scar tissue which may form after an injury.

METHODOLOGY

Study Design

Quasi experimental study with pre Vs post design.

Study Setting

The study was conducted in out patient department of SPORTS REHABILITATION AND PHYSIOTHERAPY, ORTHO ONE ORTHOPAEDICS SPECIALITY CENTER, Singanallur Coimbatore. Under the supervision of concerned authority.

Sample Design

Simple random sampling

Sample size

Group A (10 subjects)

Group B (10 subjects)

Study Duration

6 weeks (4 to 5 sessions per week).

Inclusion Criteria

- Male and female cyclists,
- Age group-20 to 30 years,
- Sub-acute and chronic IT band friction syndrome,

Exclusion Criteria

- Recent surgeries,
- Acute Ligament injuries,
- Unhealed lower limb fractures
- Neurological disorders,
- Bone disorders.

Materials

- VAS SCALE chart.
- Foam roll.
- Cable machine,
- pillow
- Medicine ball,
- Ultrasound & gel.

Variables

Independent variables: Ultrasuond , Foam roller , Medicine ball,

Dependent variables: Pain, Strength , Flexibility

Evaluation tools

1. Visual analogue scale (VAS),

2. Modified Cincinnati Rating System Questionnaire (MCRSQ).

PROCEDURE

A total number of 20 subjects who met the inclusion criteria were recruited by convenient sampling method. After the informed consent obtained they were divided into 2 groups- group A and group B with 10 subjects in each group.

After a brief demonstration about the procedures, Group A subjects were subjected to Ultrasound 1 week with foam roll over IT band for a period of 4 weeks.

After a brief demonstration about the procedures, Group B subjects were subjected to Ultrasound 1 week with adductor strengthening for a period of 4 weeks.

Pre test and Post test results were recorded and compute.

ULTRASOUND TECHNIQUE

Patients on the side lying position with proper pillow support and comfort

Method:

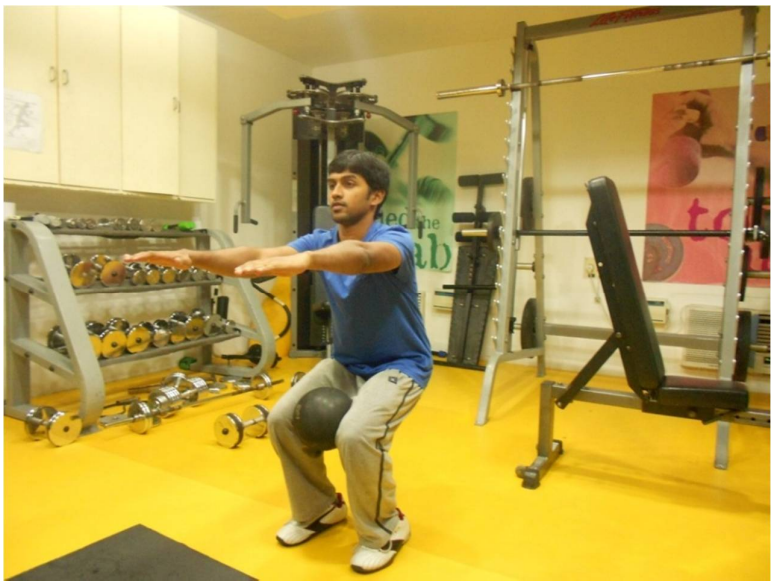
- Ensure that the intensity was at zero.
- Turn the knob to continuous mode.
- Apply ultrasonic gel over the treatment head and place it over the treatment area.
- By rotating the 3 MHz treatment head with one hand, adjust the intensity knob till it reaches 1.5 W/cm^2, for duration of 8 minutes.

Cable Adductions

Secure a cuff around left ankle and attach it to a low pulley. Stand with left side to the pulley so that your leg is away from the midline of your body. Hold on to an exercise bench or similar for support and balance. Keeping leg straight, draw left leg inward until it touches right. Pause in this position for a second before slowly returning to the starting position and repeating. On completion, change legs and perform the same number of repetitions using right leg. 12-15 repetitions, 3 sets/day.

Medicine Ball Squats

Stand with feet hip-width apart. Place a light medicine ball or soccer ball between knees. Keeping the ball in place by squeezing knees together, squat until knees are bent to 90 degrees and thighs are parallel to the floor. Push hips forward and straighten knees to stand up. Make sure that you concentrate on pushing knees in against the ball throughout this exercise. 15-18 repetitions, 3 sets/day.



ILIOTIBIAL BAND FOAM ROLL

1. Place a foam roller on the floor, and lie on your left side with the roller just under your left knee and with your left arm propping your upper body.

2. Keep your right leg bent on the floor in front of you. Place your right hand on the floor to aid in supporting your body during rolling.

3. Roll the foam roller up and down between your knee and hip.

DATA ANALYSIS AND INTERPRETATION

Statistical Tool

The statistical tools used in the study were paired 't' test and unpaired 't' test.

Paired 't' test:

The paired 't' test was used to find out the statistical significance between pre and post test of patients treated with Ultrasound with IT band stretching Vs Ultrasound with adductor strengthening separately.

Formula: Paired 't' test:

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between pre test Vs post test values `

$\bar{d}$ = mean difference

n = total number of subjects

s = standard deviation.

Unpaired 't' test:

The unpaired 't' test was used to compare the statistically significant difference between Group A and Group B.

Formula: Unpaired 't' test:

$$s = \sqrt{\frac{(n_1 - 1)s_1^{\,2} + (n_2 - 1)s_2^{\,2}}{n_1 + n_2 - 2}}$$

$$t = \frac{\left|\bar{x}_1 - \bar{x}_2\right|}{s\sqrt{{}^{1}/_{n_1} + {}^{1}/_{n_2}}}$$

n_1 = total number of subjects in group A

n_2 = total number of subjects in group B

x_1 = difference between pre test Vs post test of group A

$\bar{x}_1$ = mean difference between pre test Vs post test of group A

x_2 = difference between pretest Vs post test of group

$\bar{x}_2$ = mean difference between pre test Vs post test of group B

s = standard deviation.

TABLE - I

- **VAS –** visual analogue scale.
- **MCRSQ** -Modified Cincinnati Rating System Questionnaire.

This section deals with the analysis and interpretation of data collected from group A and group B who underwent ultrasound with foam roller and ultrasound with adductor strengthening.

TABLE – II

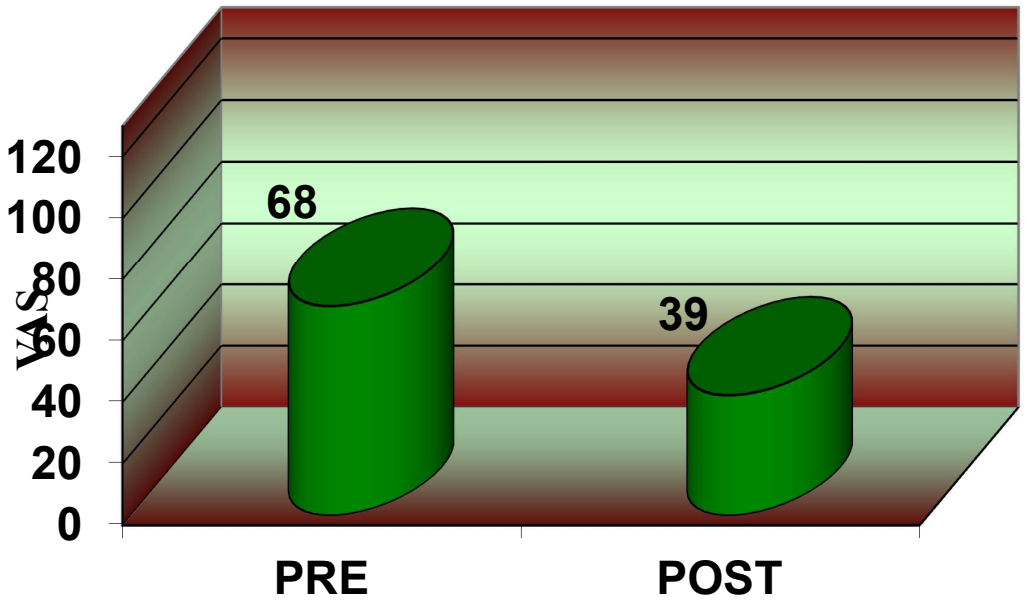
Group – A

Table II represents the mean values, mean difference, standard deviation, and paired 't' value between pre test Vs post test values of VAS for pain of group A who have been subjected to ultrasound with foam roll.

VAS	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	60	28	.42	21
Post test	32			

It shows the analysis of knee pain; the paired 't' value of pre Vs post sessions of group A was 10.47 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 6.8, the post test mean was 3.9 and mean difference was which showed that there was a decrease in VAS score after intervention in post test indicating the recovery of selected samples in response to intervention.

Graph I – VAS for Group A



Pre & Post test values

TABLE - III

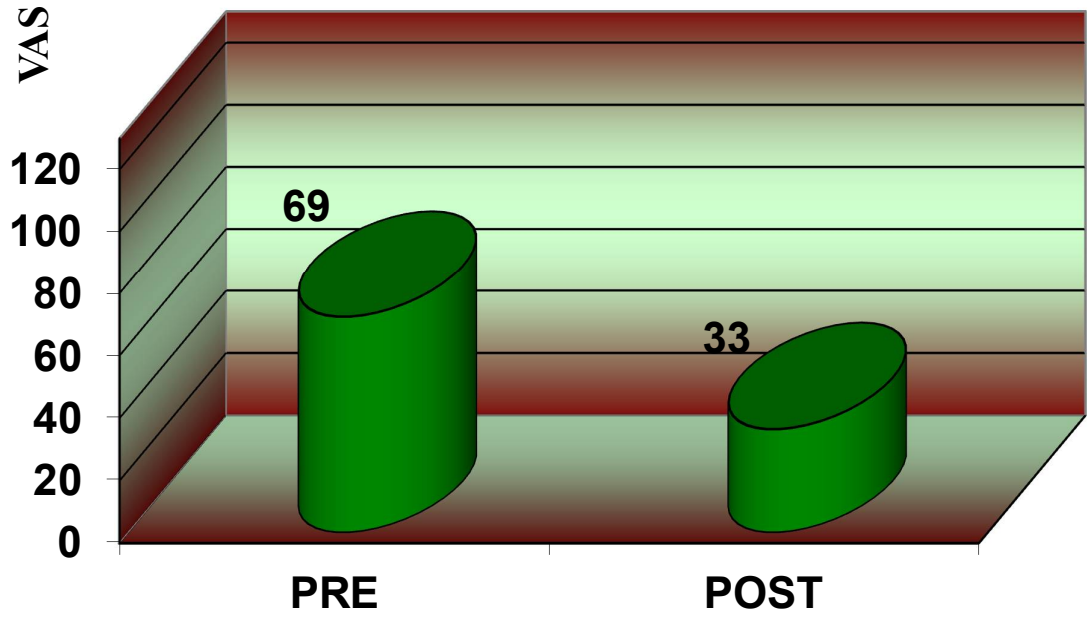
Group – B

Table III represents the mean values, mean difference, standard deviation, and paired 't' value of VAS score for pain of group B, who have been subjected to ultrasound with adductor strengthening.

VAS	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	62	38	.63	19
Post test	24			

Table III shows the analysis of knee pain; the paired 't' value of pre Vs post sessions of group B was 11.78 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 6.9, the post test mean was 3.3 and mean difference was 3.6, which showed that there was a decrease in VAS score in post test indicating the recovery of selected samples in response to intervention

Graph II –VAS for Group B



Pre & Post test value

TABLE – IV

Table IV represents the comparative mean values, mean difference, standard deviation, and unpaired 't' value between group A and group B on knee pain Evaluation.

VAS	Mean	Mean difference	Standard deviation	Unpaired 't' value
Group A	29	7		
Group B	36			

Table IV shows the analysis of group A and group B with knee pain Evaluation. The unpaired 't' value of 3 was greater than the tabulated 't' value of at 0.05 level of significance which showed that there was statistically significant difference between group A and group B. The mean value of group A was and the mean value of group B was, which showed that there was a greater improvement in group B than group A.

Therefore, the study is rejecting the null hypothesis and accepting the alternate hypothesis.

Graph III - Mean difference of Group A and Group B – VAS

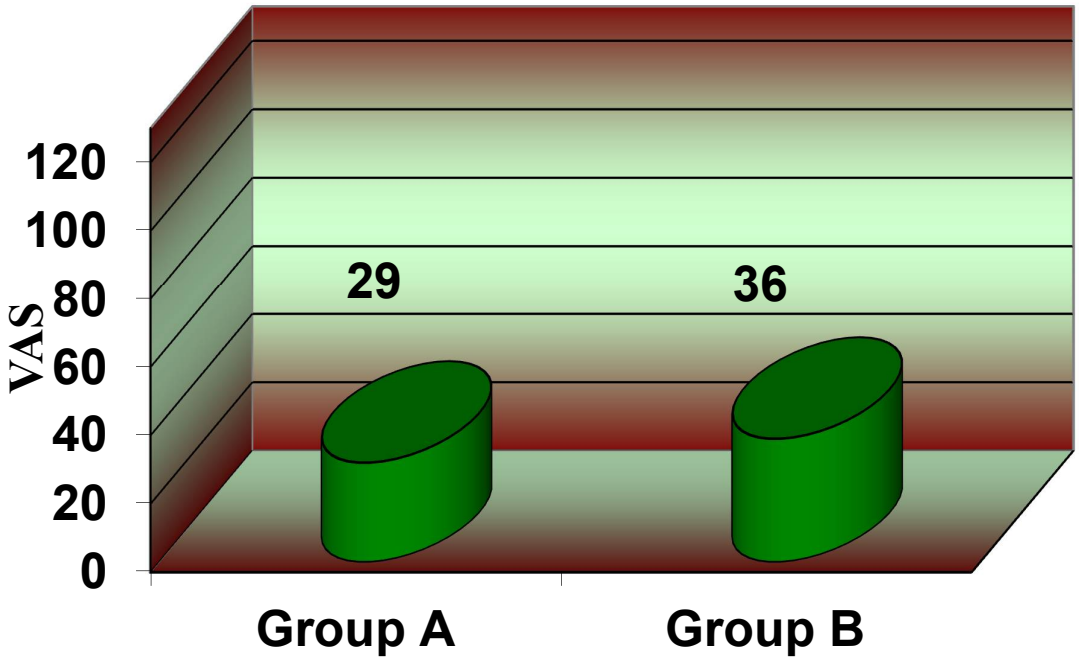


TABLE - V

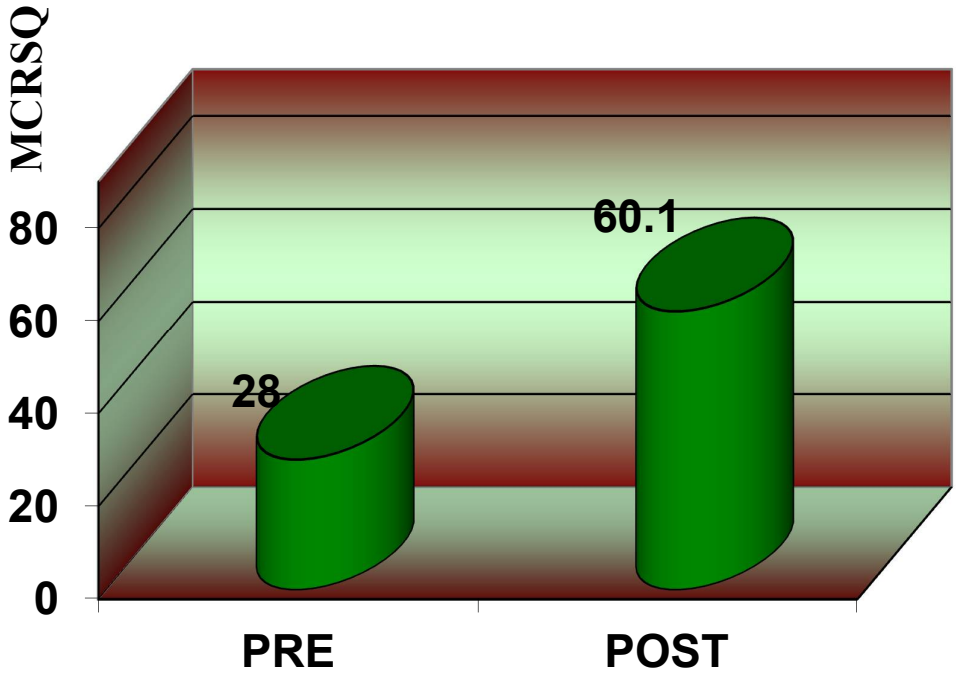
Group – A

Table V represents the mean values, mean difference, standard deviation, and paired 't' value between pre test Vs post test values of MCRSQ of group A who have been subjected to ultrasound with foam roll

MCRSQ	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	365	108	.388	27.78
Post test	473			

Table V shows the analysis of MCRSQ; the paired 't' value of pre Vs post sessions of group A was 13.91 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 28, the post test mean was 60.1 and mean difference was 32.1, which showed that there was an increase in MCRSQ in post test indicating the recovery of selected samples in response to intervention

Graph IV– MCRSQ for Group A



Pre & Post test v

TABLE - VI

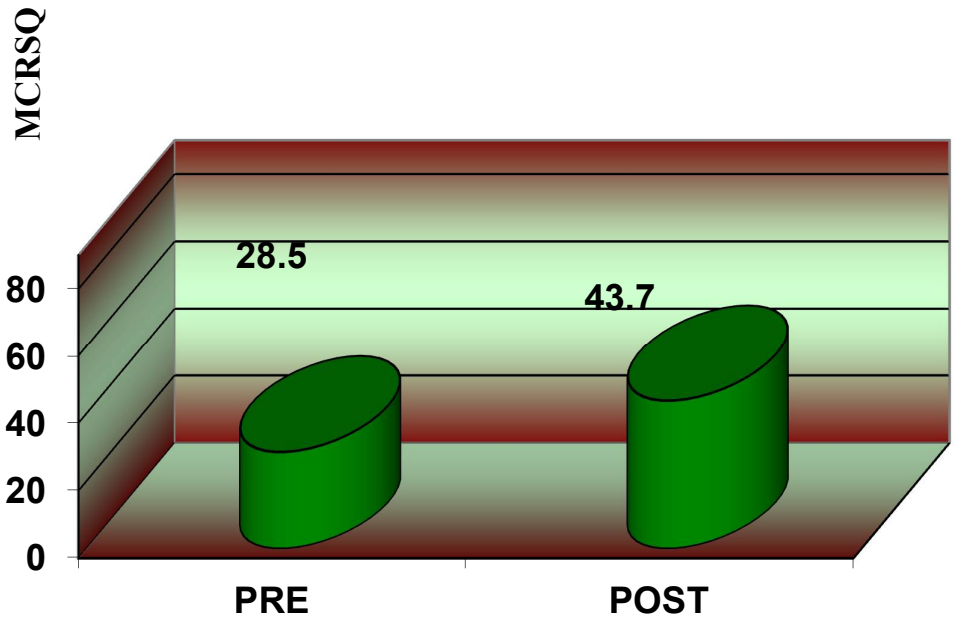
Group – B

Table VI represents the mean values, mean difference, standard deviation, and paired 't' value of MCRSQ for group B, who have been subjected to ultrasound with adductor strengthening.

MCRSQ	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	360	133	.823	51.087
Post test	493			

Table VI shows the analysis of MCRSQ; the paired 't' value of pre Vs post sessions of group B was 14.59 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 28.5, the post test mean was 43.7 and mean difference was 15.2, which showed that there was an increase in MCRSQ in post test indicating the recovery of selected samples in response to intervention.

Graph V– MCRSQ for GROUP B



Pre & Post test values

TABLE - VII

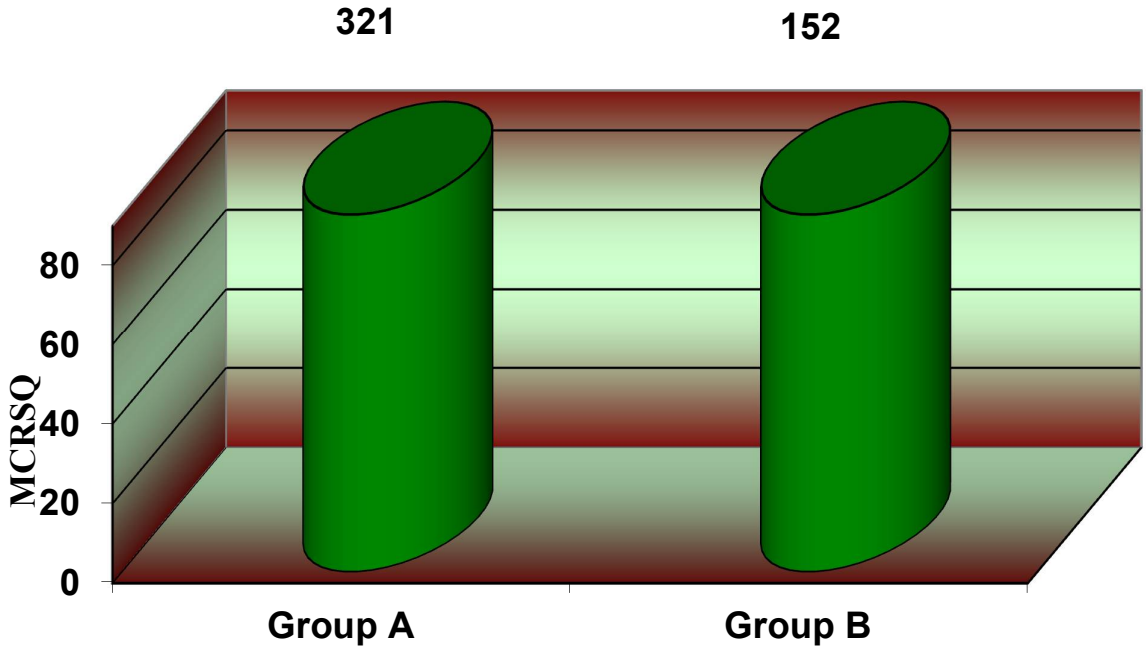
Table VII represents the comparative mean values, mean difference, standard deviation, and unpaired 't' value between group A and group B.

MCRSQ	Mean	Mean difference	Standard deviation	Unpaired 't' value
Group A	321	169		
Group B	152			

Table VII shows the analysis of group A and group B with MCRSQ. The unpaired 't' value of 12 was greater than the tabulated 't' value of at 0.05 level of significance which showed that there was statistically significant difference between group A and group B. The mean value of group A was and the mean value of group B was, which showed that there was a greater improvement in group B than group A.

Therefore, the study is rejecting the null hypothesis and accepting the alternate hypothesis.

Graph VI - Mean difference of Group A and Group B – MCRSQ



DISCUSSION

As the ultrasound waves pass from the treatment head into the skin they cause the vibration of the surrounding tissues, particularly those that contain collagen. This increased vibration leads to the production of heat within the tissue. In most cases this cant be felt by the patient themselves. This increases in temperature may cause an increase in the extensibility of structures such as ligaments, tendons, scar tissue and fibrous joint capsules. In addition, heating may also help to reduce pain, muscle spasm and promote the healing process.

Table II represents the mean values, mean difference, standard deviation, and paired 't' value between pre test Vs post test values of VAS for pain of group A who have been subjected to ultrasound with foam roller . It shows the analysis of knee pain; the paired 't' value of pre Vs post sessions of group A was 10.47 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 6.8, the post test mean was 3.9 and mean difference was 2.9, which showed that there was a decrease in VAS score after intervention in post test indicating the recovery of selected samples in response to intervention.

Table III represents the mean values, mean difference, standard deviation, and paired 't' value of VAS score for pain of group B, who have been subjected to ultrasound with adductor strengthening. It shows the analysis of knee pain; the paired 't' value of pre Vs post sessions of group B was 11.78 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 6.9, the post test

mean was 3.3 and mean difference was 3.6, which showed that there was a decrease in VAS score in post test indicating the recovery of selected samples in response to intervention

Table IV represents the comparative mean values, mean difference, standard deviation, and unpaired 't' value between group A and group B on knee pain Evaluation it shows the analysis of group A and group B with knee pain Evaluation. The unpaired 't' value of 3 was greater than the tabulated 't' value of at 0.05 level of significance which showed that there was statistically significant difference between group A and group B. The mean value of group A was and the mean value of group B was, which showed that there was a greater improvement in group B than group A.

Table V represents the mean values, mean difference, standard deviation, and paired 't' value between pre test Vs post test values of MCRSQ of group A who have been subjected to ultrasound with foam roller it shows the analysis of MCRSQ; the paired 't' value of pre Vs post sessions of group A was 13.91 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 28, the post test mean was 60.1 and mean difference was 32.1, which showed that there was an increase in MCRSQ in post test indicating the recovery of selected samples in response to intervention.

Table VI represents the mean values, mean difference, standard deviation, and paired 't' value of MCRSQ for group B, who have been subjected to ultrasound with adductor strengthening. It shows the analysis of MCRSQ; the paired 't' value of pre Vs post sessions of group B was 14.59 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant

difference in between pre Vs post test results. The pre test mean was 28.5, the post test mean was 43.7 and mean difference was 15.2, which showed that there was an increase in MCRSQ in post test indicating the recovery of selected samples in response to intervention.

Table VII represents the comparative mean values, mean difference, standard deviation, and unpaired 't' value between group A and group B , it shows the analysis of group A and group B with MCRSQ. The unpaired 't' value of 12 was greater than the tabulated 't' value of at 0.05 level of significance which showed that there was statistically significant difference between group A and group B. The mean value of group A was and the mean value of group B was, which showed that there was a greater improvement in group B than group A.

SUMMARY AND CONCLUSION

SUMMARY

This study consists of 20 patients into two groups, Group A consists of 10 patients treated with Ultrasound with foam roller and Group B consists of 10 patients treated with Ultrasound with adductor strengthening for IT band friction syndrome. There is significant improvement in function and reduced pain within the groups (Group A) and the (Group B)

Comparing this two groups, Group B who has been treated with Ultrasound with adductor strengthening for IT band friction syndrome have a increased lower limb functional activities (mean difference is 152, $p<0.001$) of the IT band friction syndrome than the Group B who has been treated with Ultrasound with foam roller (mean difference is 321, $p<0.001$).

In visual analogue scale Group B who has been treated with Ultrasound with adductor strengthening for IT band friction syndrome pain was reduced (mean difference is 36) than the Group A who has been treated with Ultrasound with foam roller (mean difference is 29).

Based on the statistical analysis and interpretation of the results, the present study showed that there was significant improvement regarding pain, functional status in patients with IT band friction syndrome treated with ultrasound and adductor strengthening.

Therefore, the present study is accepting alternate hypothesis and rejecting null hypothesis.

CONCLUSION

The results show there is significant improvement within the groups (Group A) Ultrasound with foam roller and the (Group B) Ultrasound with adductor strengthening.

There was a significant improvement in lower extremity functions and pain was reduced between the groups also, there was a significant improvement in Ultrasound with adductor strengthening groups than the Ultrasound with foam roller.

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Clinical applications of visual analogue scales: a critical review

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APPENDIX

DATA PRESENTATION

S.No	Group A Ultrasound with stretching				Group B Ultrasound with adductor strengthening			
	VAS		MCRSQ		VAS		MCRSQ	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1.	7	4	32	43	7	4	32	47
2.	6	3	34	45	6	2	41	54
3.	7	5	28	37	5	1	39	52
4.	5	3	35	48	6	2	44	57
5.	6	3	29	39	7	3	49	62
6.	4	1	50	62	7	4	30	43
7.	7	4	43	54	4	1	36	48
8.	6	3	40	51	7	2	27	40
9.	5	2	43	52	6	2	32	46
10.	7	4	31	42	7	3	30	44

PARAMETERS

MODIFIED CINCINNATI RATING SYSTEM QUESTIONNAIRE

This questionnaire has been designed to give your therapist information as to how your knee pain has affected your ability to manage in everyday life. Please answer every question by placing a mark in the box that best describes your condition today.

During the past 4 weeks.....

Section 1 - Pain Intensity	Section 2 –Swelling
No pain, normal knee, performs 100%	No swelling
Occasional pain with strenuous sports or heavy work, knee not entirely normal, some limitations but minor and tolerable	Occasional swelling with strenuous sports or heavy work. Some limitations but minor and tolerable
Occasional pain with light recreational sports or moderate work activities, running or, heavy labour, strenuous sports	Occasional swelling with light recreational sports or moderate work ativities. Frequently brought on by vigorous activities, running, heavy labour, and strenuous sport
Pain, usually brought on by sports, light recreational activities or	Swelling limits sports and moderate work. Occurs infrequently with

moderate work. Occasionally occurs with walking, standing or light work	simple walking activities or light work (approx 3 times a year)
Pain is a significant problem with simple activity such as walking, relieved by rest, unable to do sports	Swelling brought on by simple walking activities and light work. Relieved by rest
Pain present all the time. Not relieved by rest	Severe problem all the time, with simple walking activities

Section 3 - Giving Way	Section 4 - Overall activity level
No giving way	No limitation, normal knee, able to do everything including strenuous sports or heavy labour
Occasional giving way with strenuous sports or heavy work. Can participate in all sports but some guarding or limitations present	Perform sports including vigorous activities but at lower performance level: involves guarding or some limits to heavy labour
Occasional giving way with light sports or moderate work. Able to compensate but limits vigorous activities, sports, or heavy work not	Light recreational activities possible with rare symptoms, more strenuous activities cause problems.Active but in different sports; limited to

able to cut or twist suddenly. are conveniently positioned (e.g., on a table)	moderate work
Giving way limits sports and moderate work, occurs infrequently with walking or light work (approx 3 times per year)	No sports or recreational activities possible. Walking with rare symptoms; limited to light work
Giving way with simple walking activities and light work. Occurs once per month, requires guarding	Walking, ADL cause moderate symptoms, frequent limitations
Severe problem with simple walking activities, cannot turn or twist while walking without giving way	Walking, ADL cause severe problems, persistent symptoms

Section 5 – Walking	Section 6 – Stairs
Walking unlimited	Normal, unlimited
Slight/mild problem	Slight/mild problem
Moderate problem: smooth surface possible up to approx 800m	Moderate problems only 10-15 steps possible
Severe problem, only 2-3 blocks possible	Severe problem; requires bannister support
Severe problem; requires stick or crutches	Severe problem on 1-5 steps possible

Section 7 - Running activity	Section 8 - Jumping or Twisting
Normal, unlimited; fully competitive, strenuous	Normal, unlimited, fully competitive, strenuous
Slight mild problem; run half speed	Slight to mild problem; some guarding but port possible
Moderate problem 2-4 km	Moderate problem; gave up strenuous sports, recreational sports possible
Severe problem only 1-2 blocks possible	Severe problem; affects all sports; must constantly guard
Severe problem only a few steps	Severe problem; only light activity possible (golf, swimming)

The Modified Cincinnati Rating System is 0

Grading the Modified Cincinnati Rating System Questionnaire

<30 Poor 30-54 Fair 55-79 Good >80 Excellent

INFORMED CONSENT

Name :

Age :

Sex :

Occupation :

Address for communication :

Declaration,

I have fully understood the nature and purpose of the study. I accept to be a subject in this study. I declare that the above information is true to my knowledge.

Signature of the subject Signature of the researcher

ASSESSMENT CHART

Name :

Age :

Sex :

Occupation :

Chief complaints :

Present medical history :

Past medical history :

Pain assessment :

On observation :

On palpation :

On examination : **Range of motion**

Diagnosis : **IT band friction syndrome**

Treatment : **Ultrasound with stretching /ultrasound with abductor strengthening.**

Prognosis chart :

Parameter	Before Treatment	After Treatment
VAS		